

# **WATER, WATER WHERE??**

With apologies to  
SAMUEL TAYLOR COLERIDGE  
author  
"The Rhyme of the Ancient Mariner"

December 5, 2006

# Waterworks Board

## Corporation Counsel

### Legal Support

- Contracts
- Opinions
- Engage outside counsel

## Controller

### Fiscal Support

- Budget
- Fiscal monitor
- Planning
- Audit

## Director, Contracts and Operations

### Operations oversight

- Approve plans
- Approve programs
- Receive reports and operational deliverables
- Evaluate incentives
- Water District activity coordination

## Advisory

SAB

CAG

TAG

Note: Responsibilities list represents highlights of effort

# Objective

- Is there an “industry standard” or guidance for how much water supply is “enough?”
- There are many differing opinions on what is considered *enough*, ranging from:
  - Supply supported by the overall yield under 10-year drought conditions to meet average daily demand projected for 20 years; to
  - Enough water to withstand a 50-year drought and meet average demand projected for 50 years; to
  - Enough water to withstand a 100-year drought and meet maximum day demand projected for 50 years; to
  - What is vaguely described in ‘10 States Standards’.

# IW Growth Policy

- Offer water (retail, wholesale, agreement) within IURC-approved rate structure
- Offer services to “by-passed” areas
- Coordinate with communities affected by providing or extending water services
- Provide for water supply consistent with projected needs of central Indiana

# Definition: Water Supply

- Volumetric supply availability shouldn't be confused with supply capacity. Capacity is usually targeted at maximum day demand plus ten percent reserve. (SD)
- Varies widely, dependent on a number of factors (EM):
  - By community;
  - Climate;
  - How diverse the local supply mix is (i.e. vulnerability to shortage);
  - How much "reliability" is affordable;
  - What the economic effects of shortages would be;
  - Risk tolerance;
  - Development community angst/pressure;
  - Etc. (EM)

# Planning Challenges 2002

- Insufficient Rated Treatment Capacity to Meet Peak Demand Conditions
- Lack of Sufficient Potable Water Storage
  - Projected Deficit
- Lack of Dependable Supply & Treatment Capacity to Meet Long-Term Demand
  - Projected Deficit

# METRICS ADOPTED

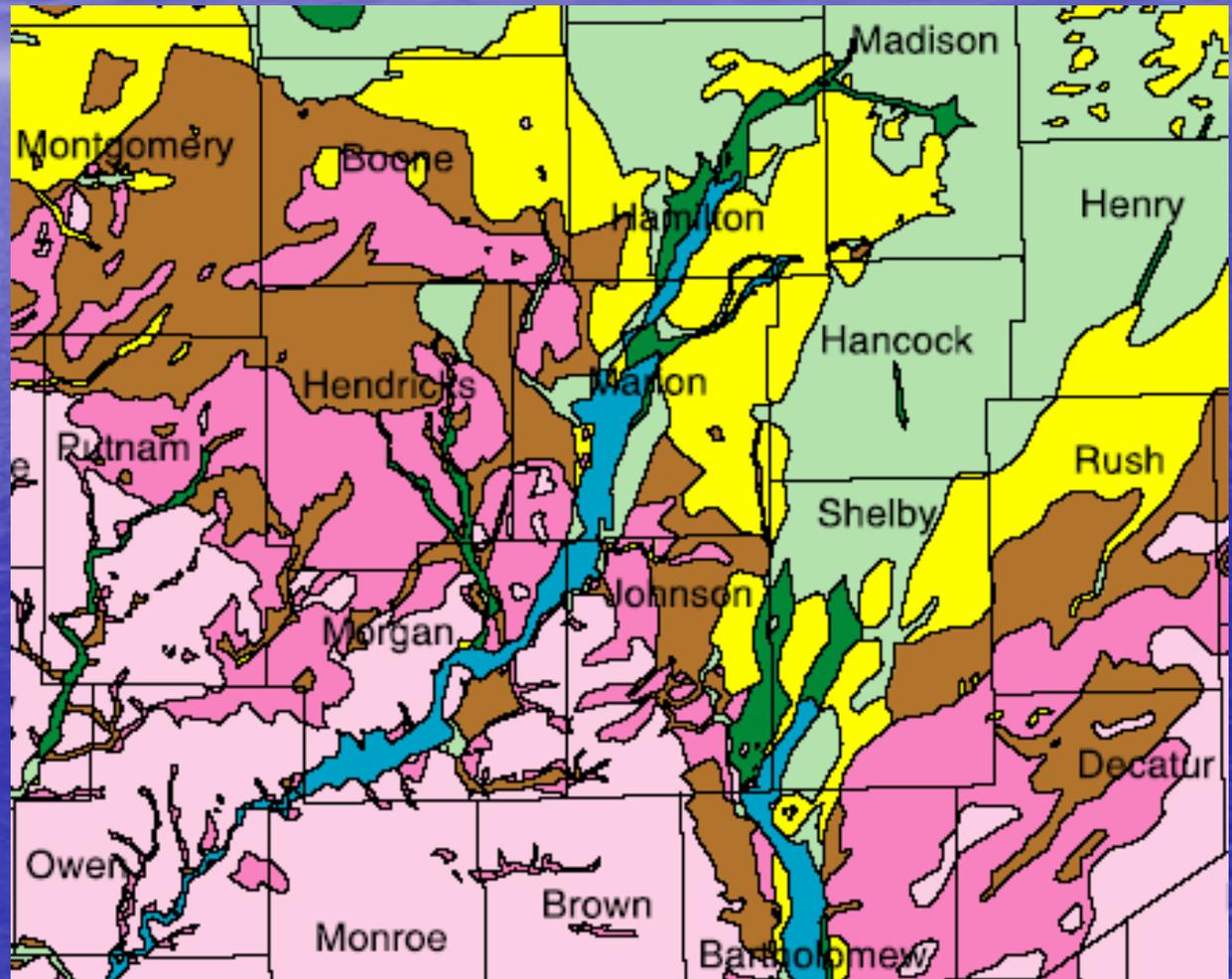
by

## IW BOARD MAR 06

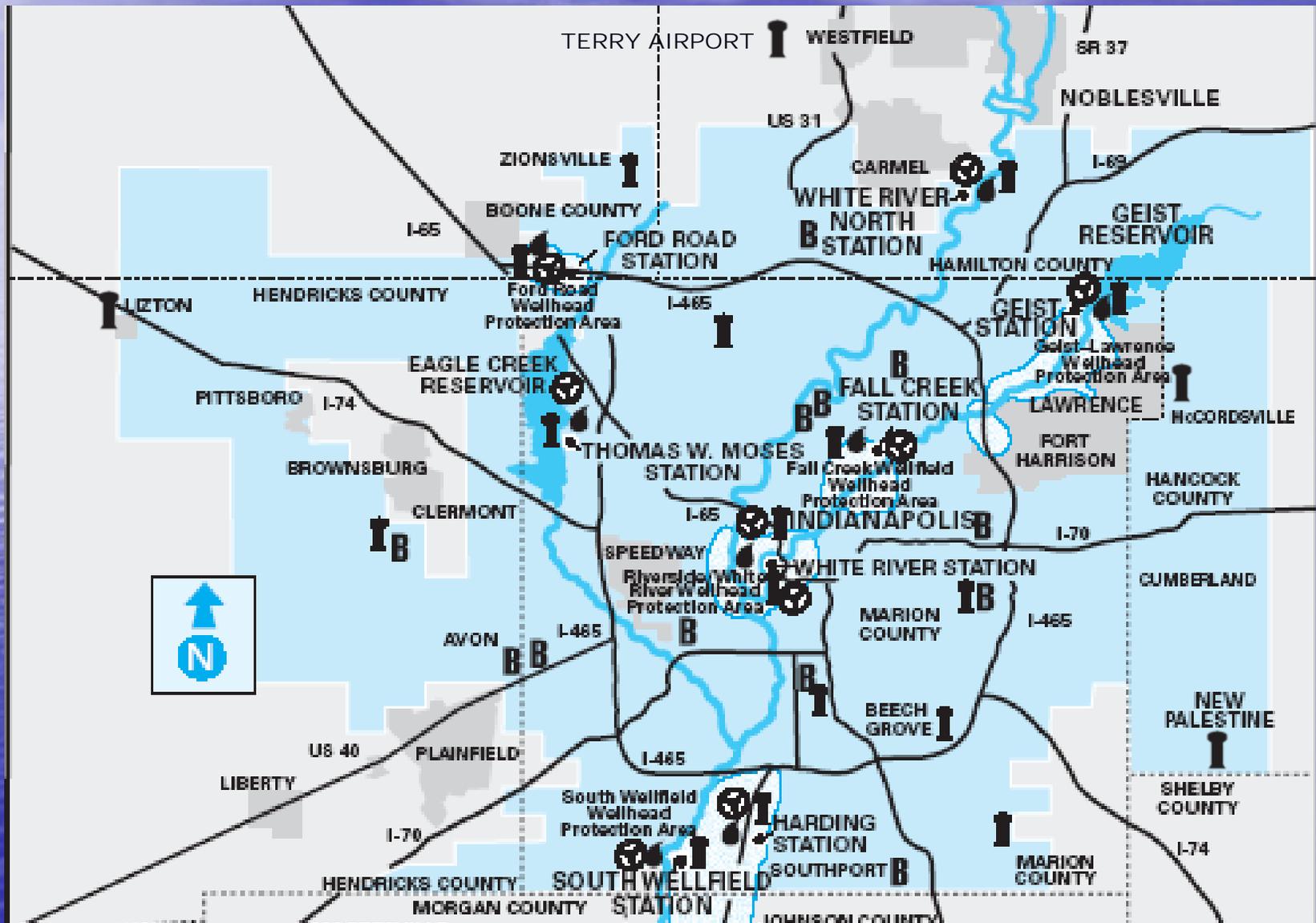
- Achieve peak day demand 99% of time
- Have storage capacity at 50% of daily average volume
- System pressure minimum 20 PSI with 30 PSI goal

# Groundwater Availability

## Generalized Aquifer Production Capacity

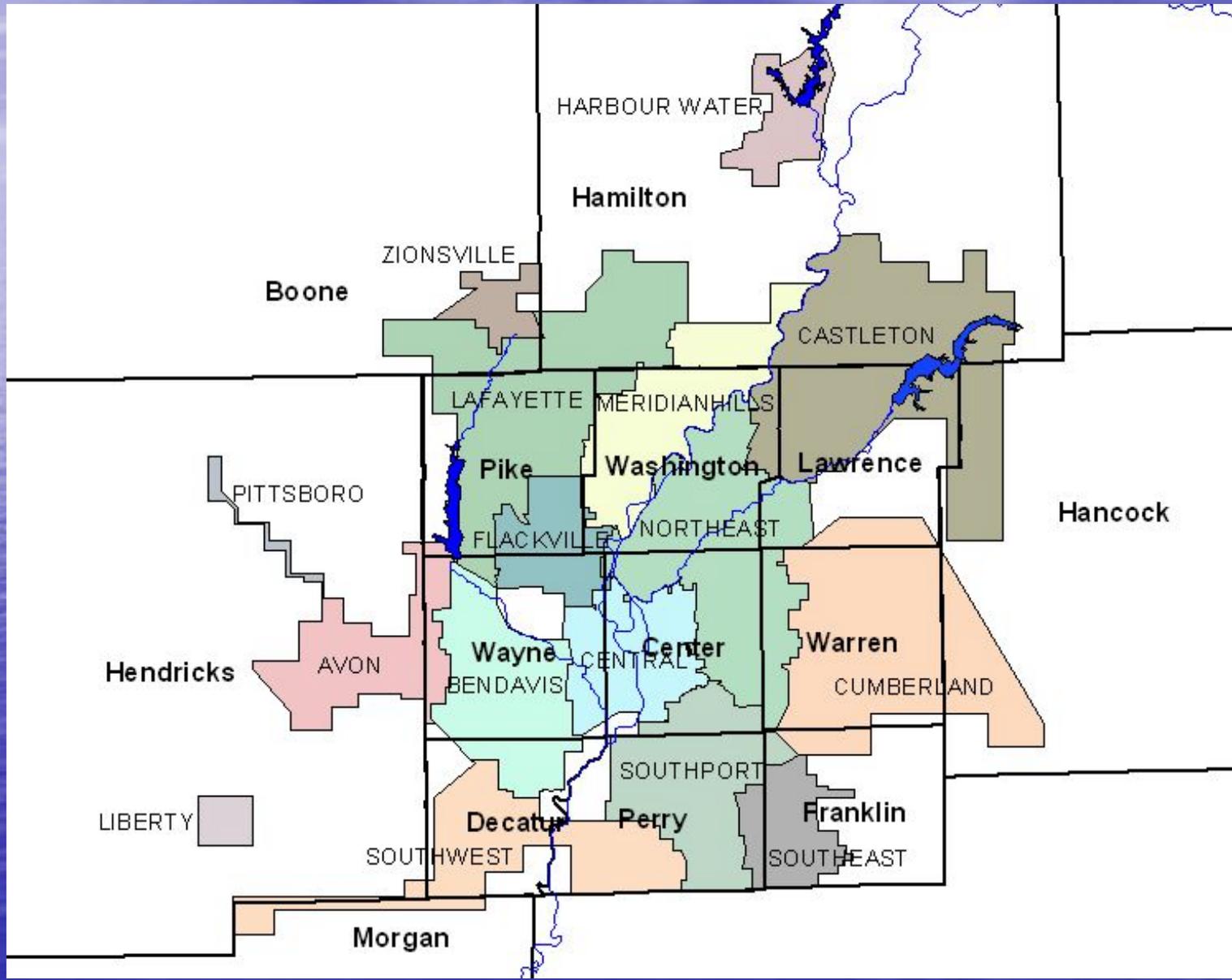


# Water Production Facilities





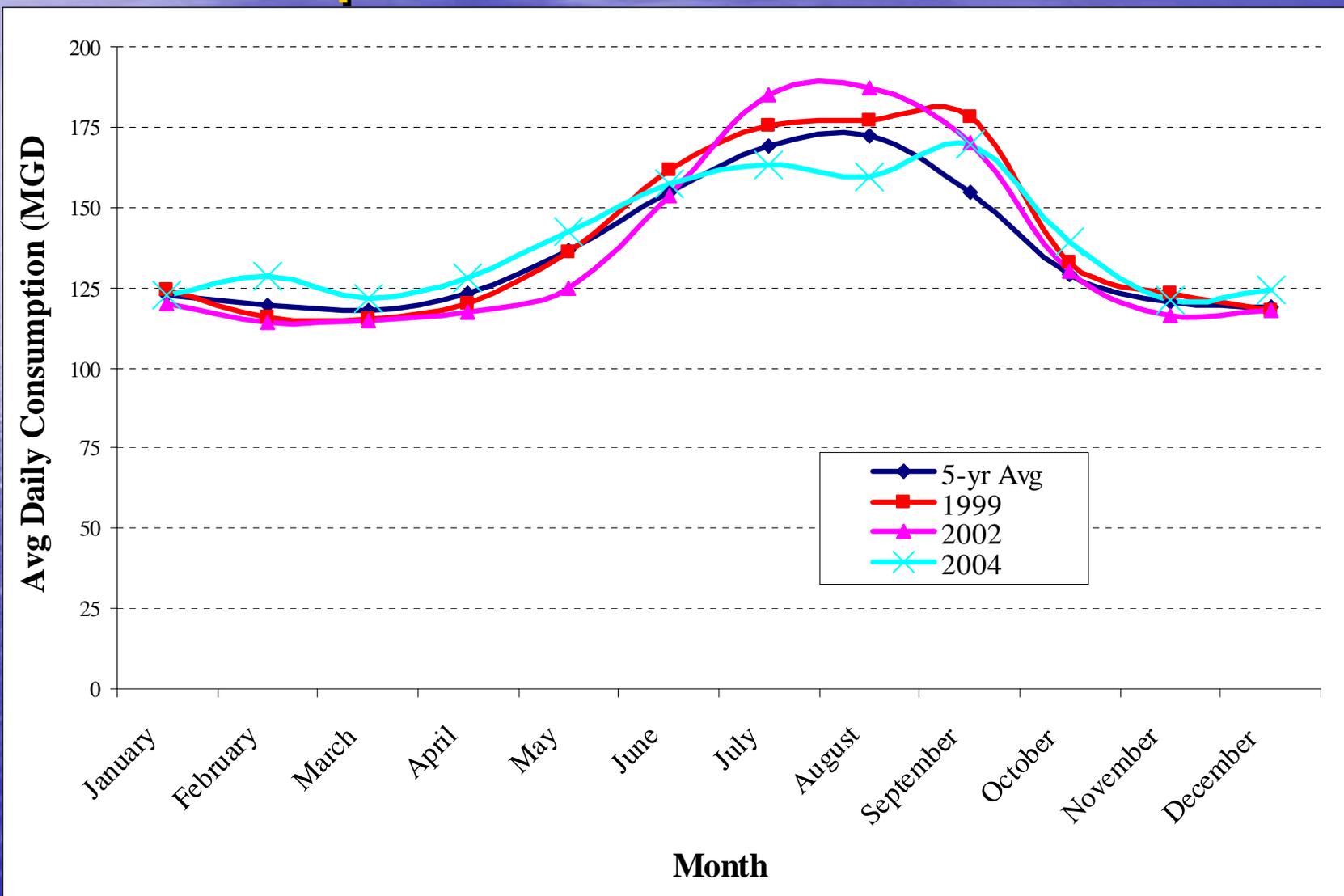
# Indianapolis Water Service Area



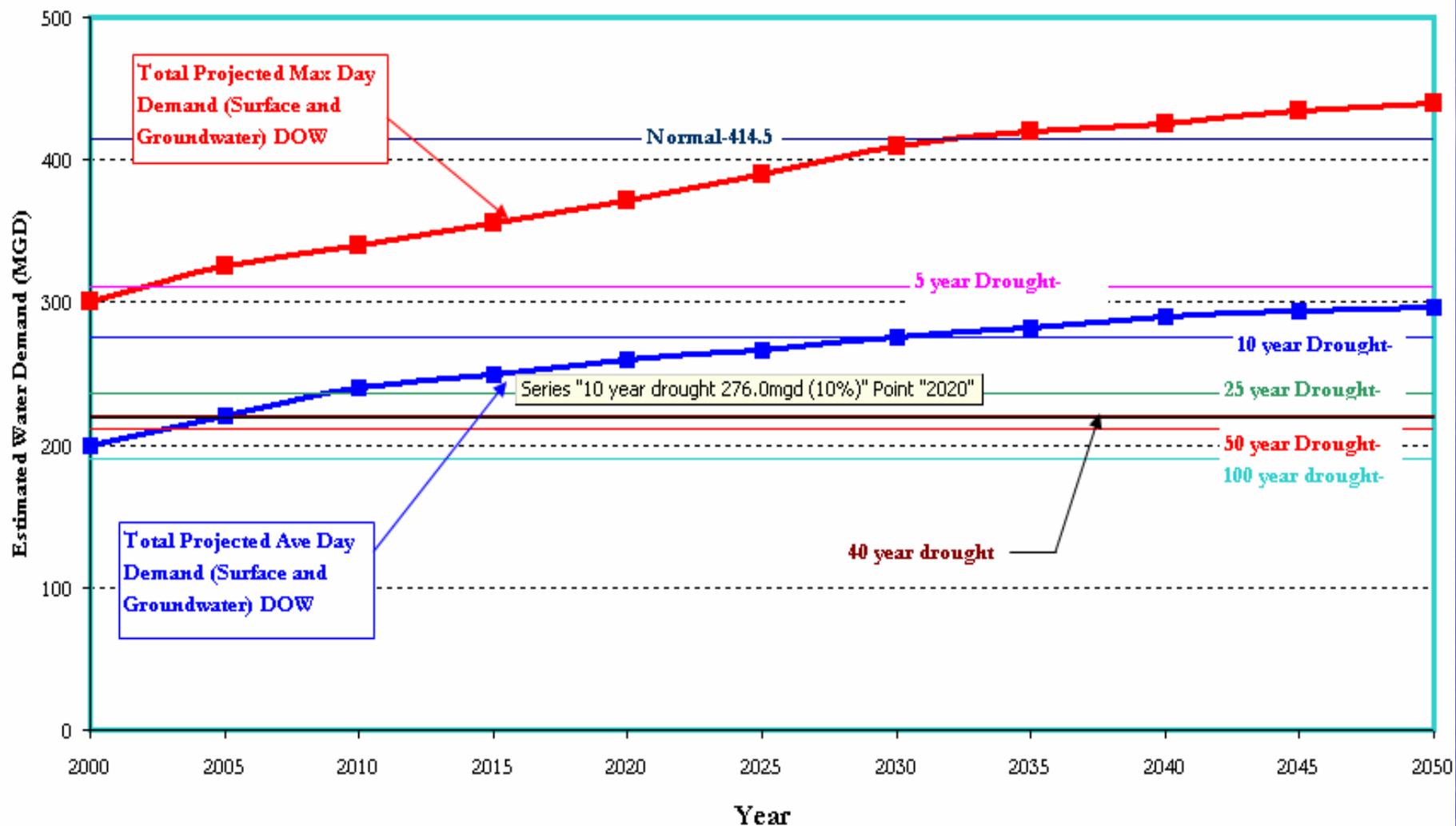
# Planning Horizon

- Generally, no clear preference for a specific planning horizon; 50 to 100 years is a reasonable timeframe.
- As for safe yield, the most common criteria is the 100-year drought, but some agencies may require a drought of record.
- State agencies often dictate what is appropriate to use for safe yield analysis and planning horizons, as they have often developed a water management program that defines "critical use areas" or similar designations that warrant source evaluations and demand management, together with consideration of environmental requirements such as minimum in-stream flows.

# Consumption Trends

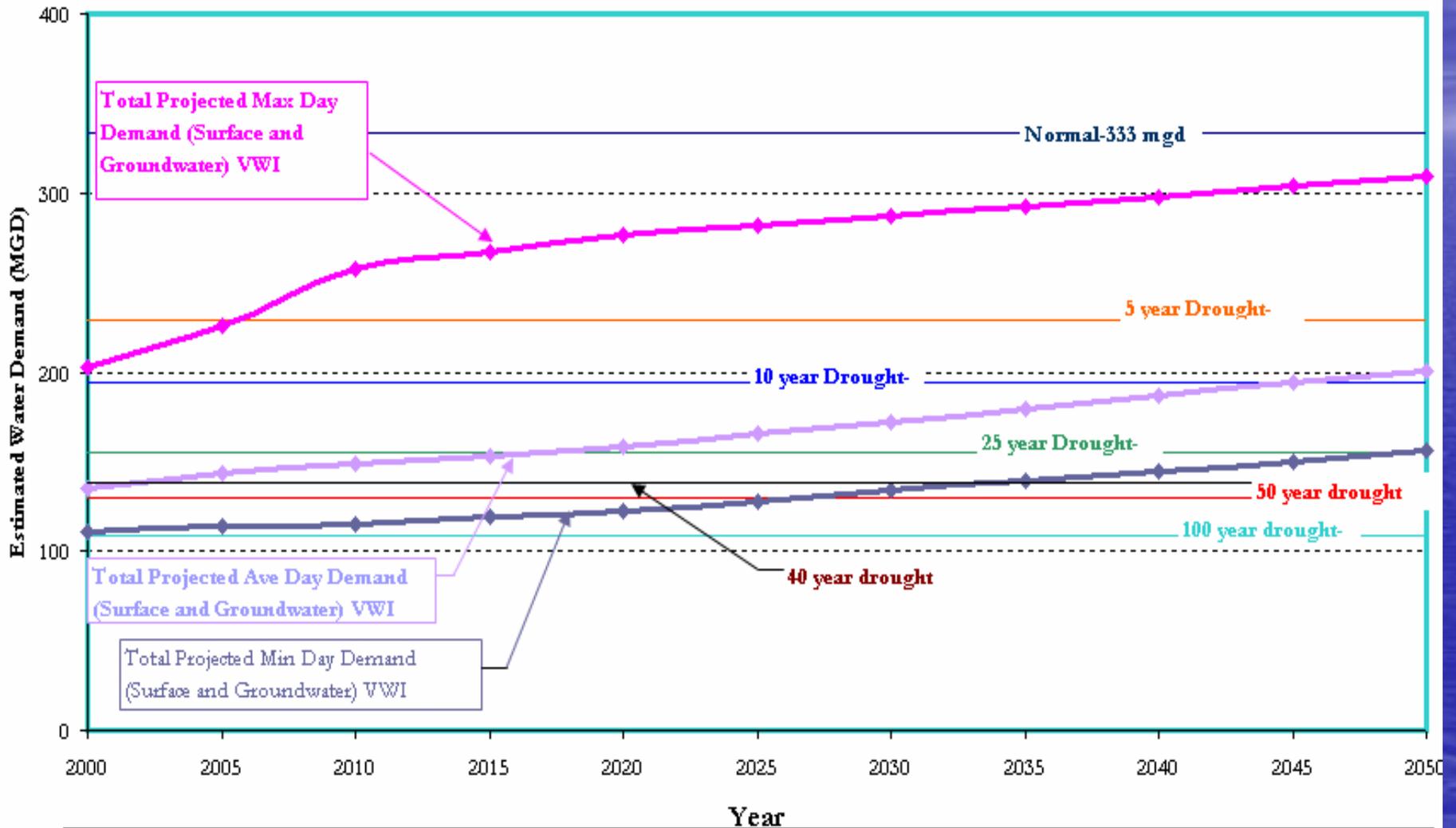


## Defining the Need for Conservation (Hamilton, Hendricks, Johnson, Marion, and Morgan Counties) vs. Drought Capacities for Indianapolis Water



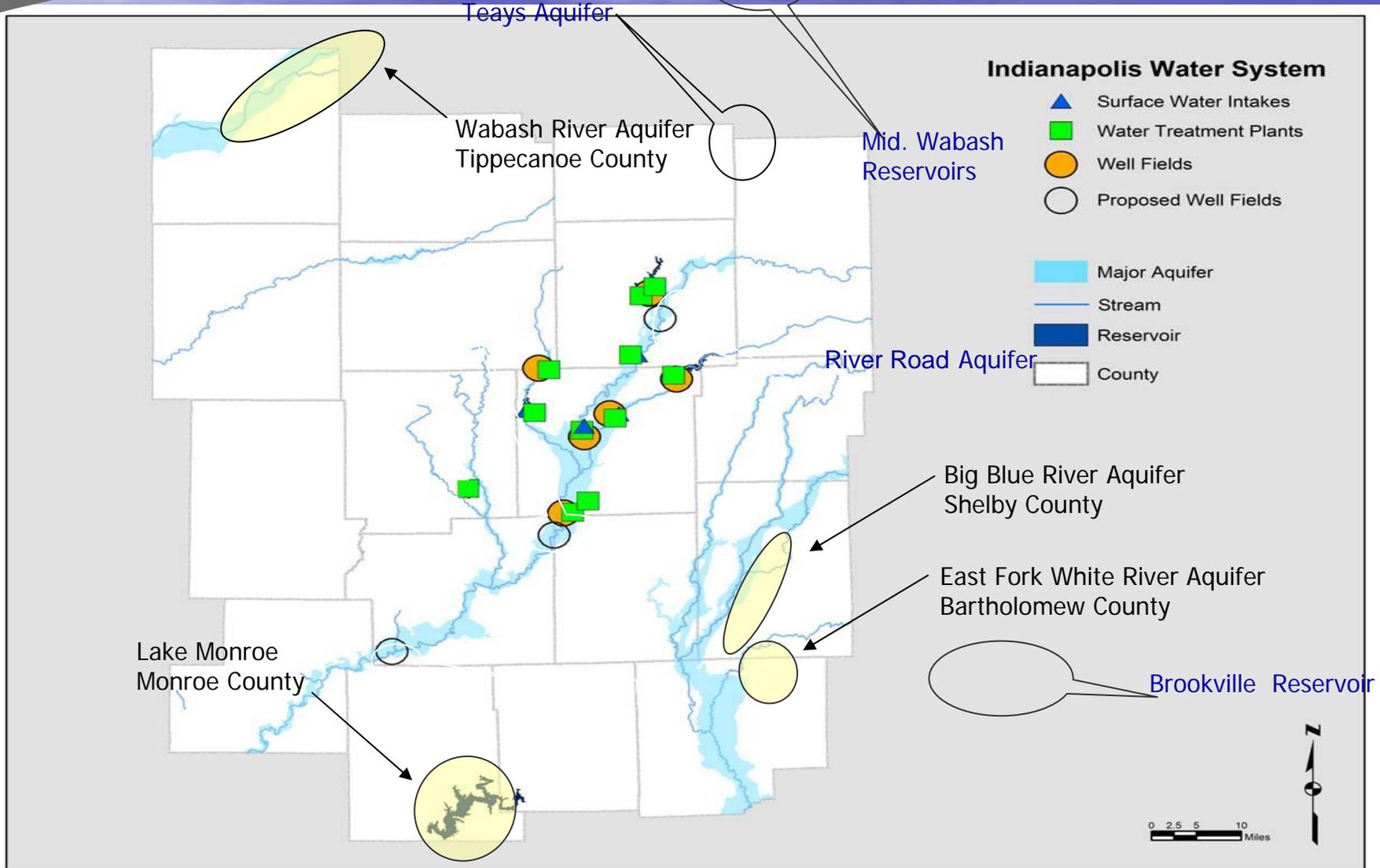
- |                                 |                                  |                                   |
|---------------------------------|----------------------------------|-----------------------------------|
| ■ DOW Ave Day Demand            | ■ DOW Max Day Demand             | — 5 year drought 310.9mgd (20%)   |
| — 25 year drought 236.7mgd (4%) | — 10 year drought 276.0mgd (10%) | — 40 year drought 219.3mgd (2.5%) |
| — 50 year drought 211.6mgd (2%) | — 100 year drought 189.7mgd (1%) | — Normal 414.5mgd                 |

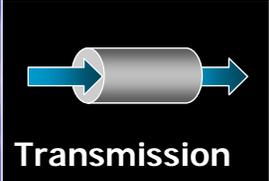
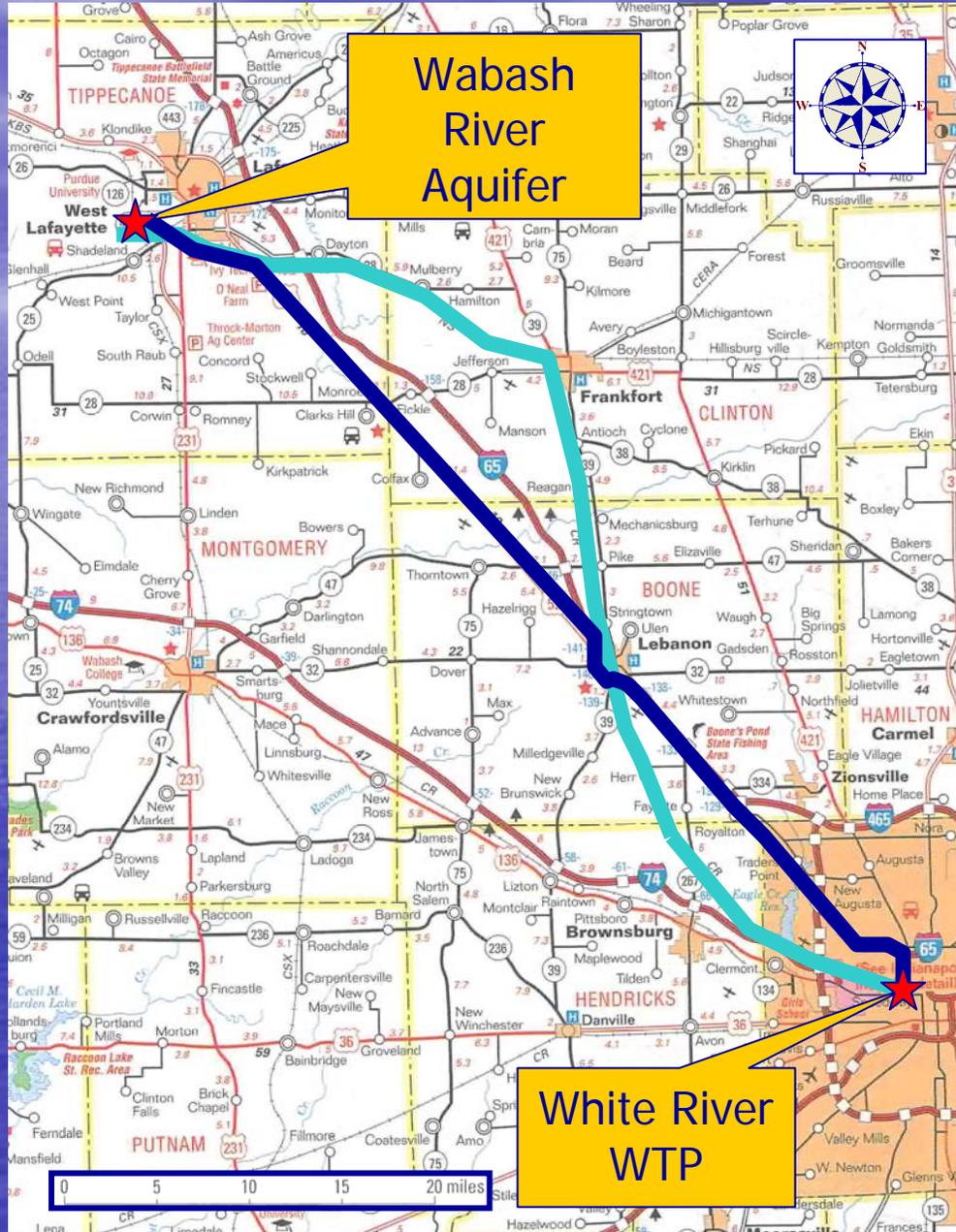
## Calculated System Net Yields for Indianapolis Water



5 year drought 229.4mgd (20%)	25 year drought 155.2mgd (4%)	10 year drought 194.0mgd (10%)
40 year drought 137.8mgd (2.5%)	50 year drought 130.1mgd (2%)	100 year drought 108.2mgd (1%)
Normal 333.0mgd	VWI Max Day Demand	VWI Ave Day Demand
VWI Min Day Demand		

# More Than one Potential Additional Source of Water

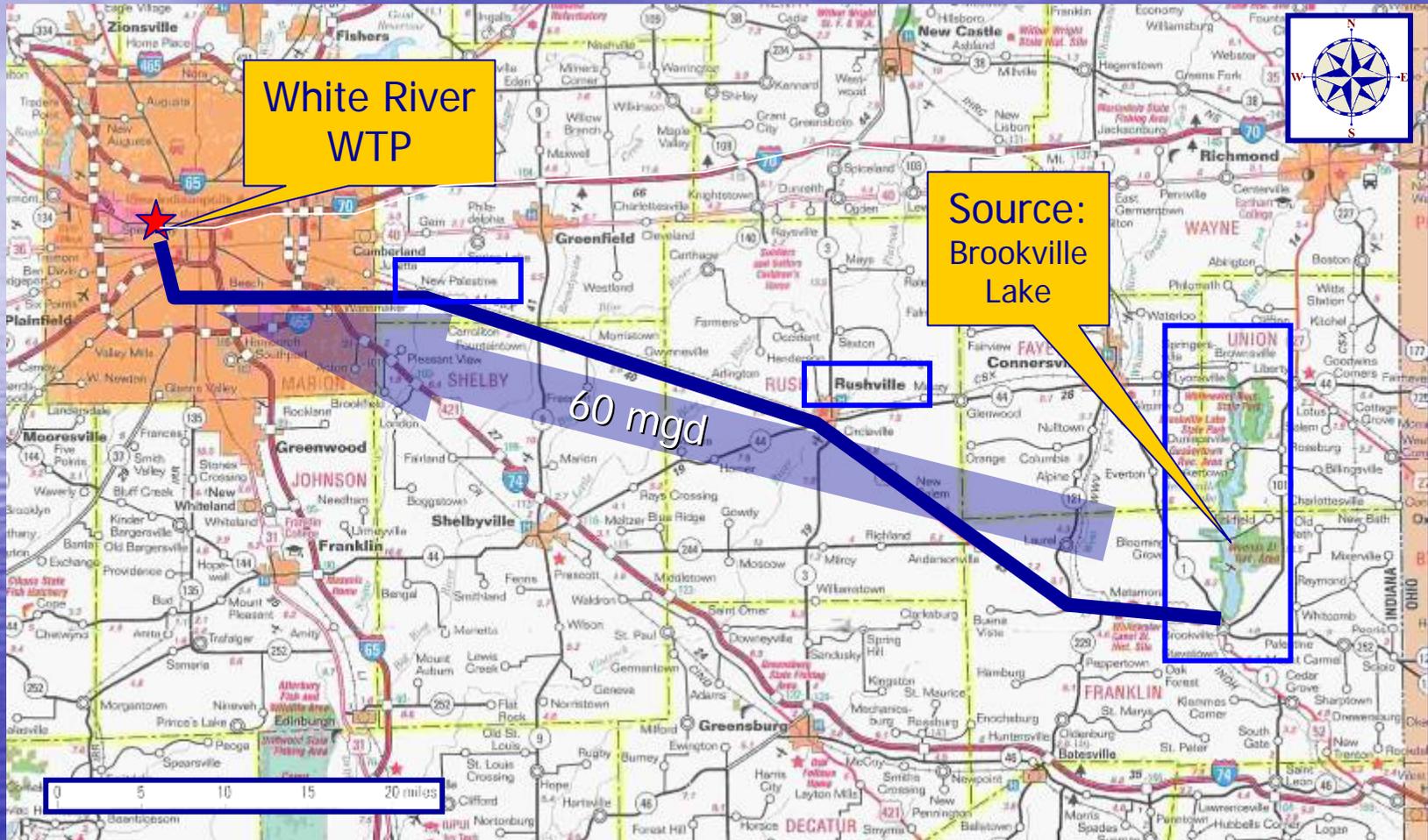
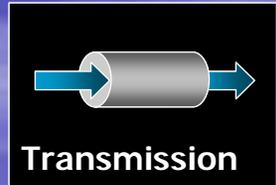




**Route 1**  
 Along US-52 & I-65  
 ~ 66 miles

**Route 2**  
 Along Railways  
 ~ 71 miles

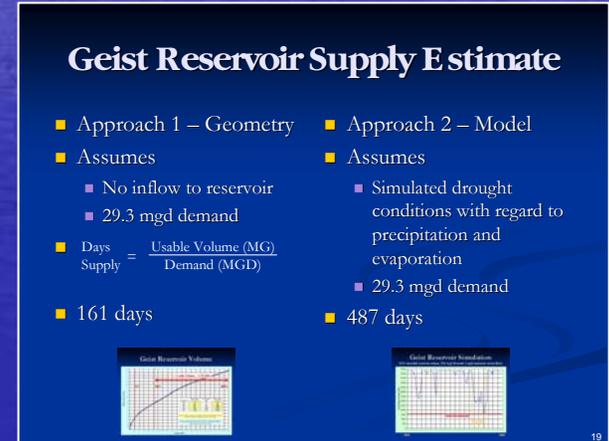
# Route



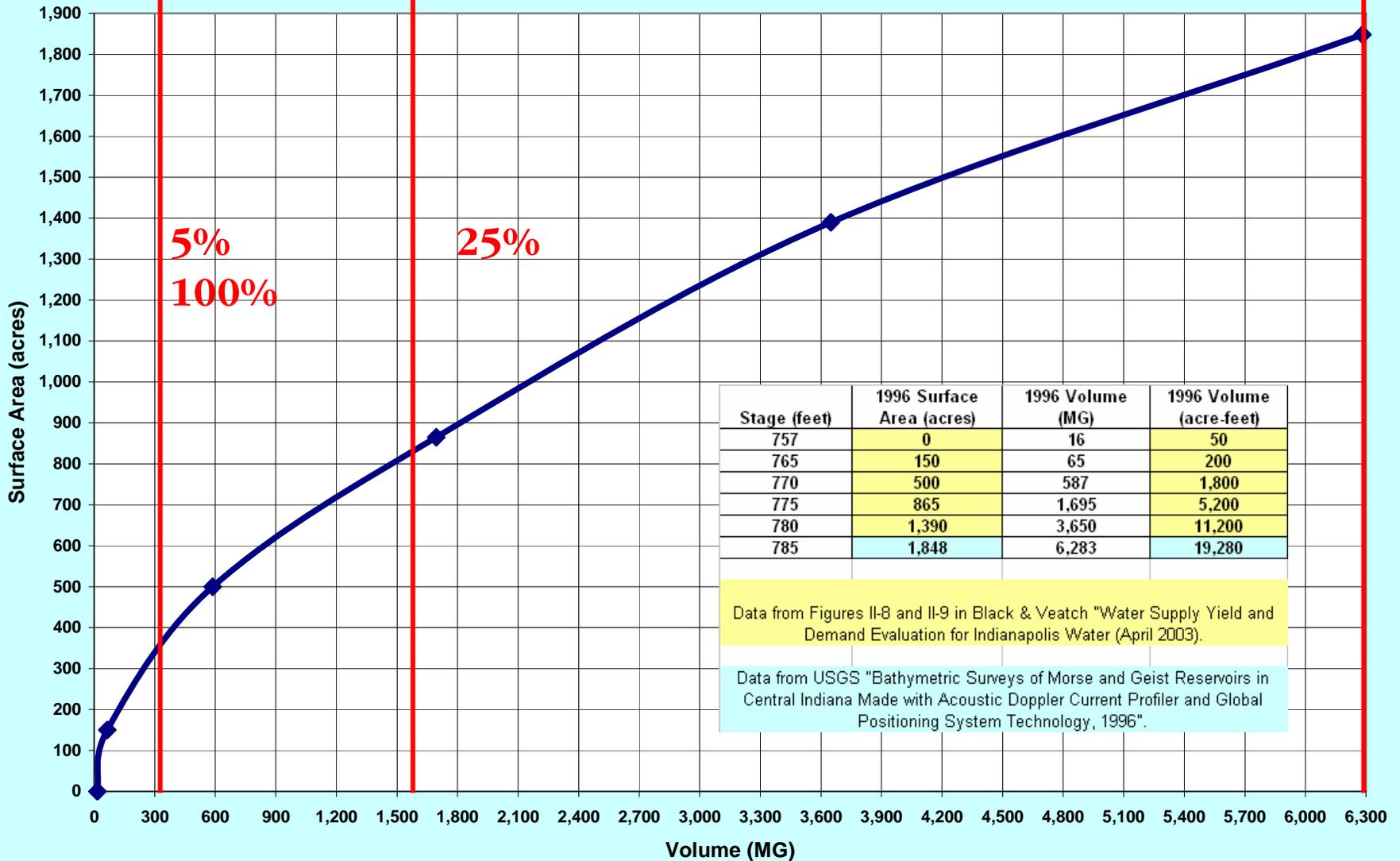
~74 miles

# Supply Estimate Considerations

- A geometry-based estimate may grossly underestimate the available storage from a reservoir
- When modeled, the Geist Reservoir was determined to have 487 days storage, as compared to 161 days (estimated using a geometric approach)... 3 times the storage
- If we apply the same factor to Morse Reservoir, supply can be estimated to last 111 – 183 days

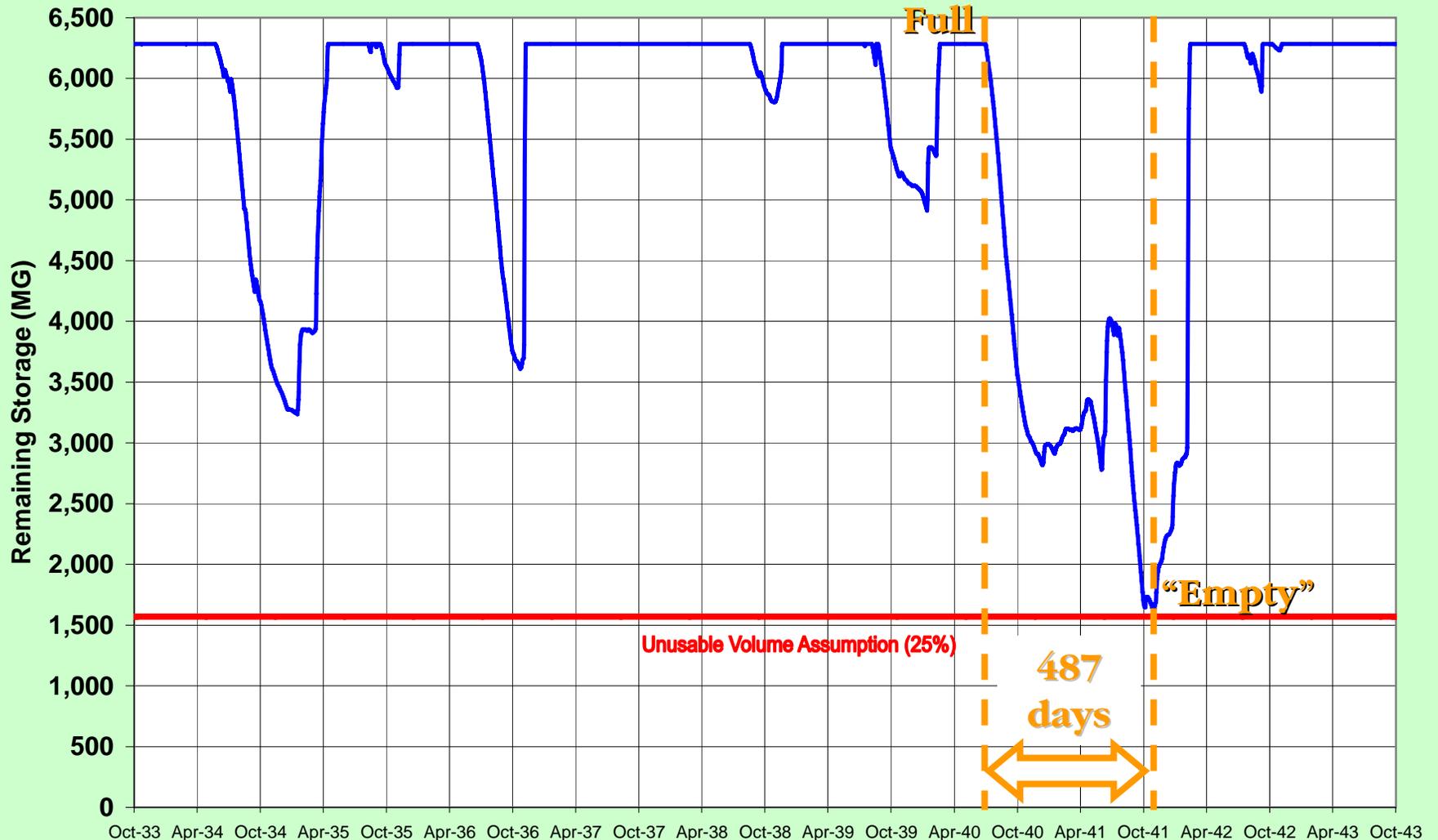


# Geist Reservoir Volume



# Geist Reservoir Simulation

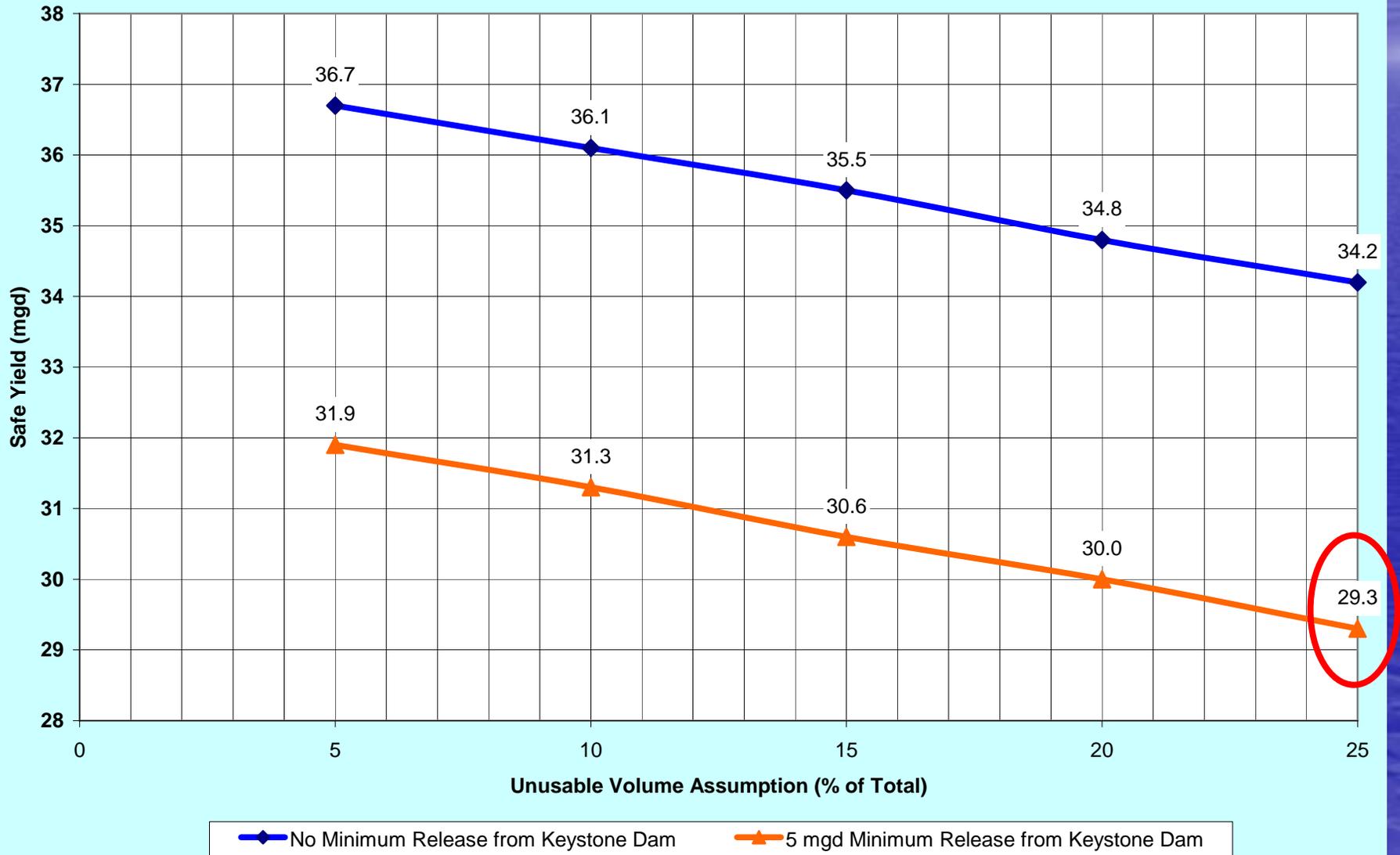
(25% unusable reservoir volume, 29.3 mgd demand, 5 mgd minimum stream flow)



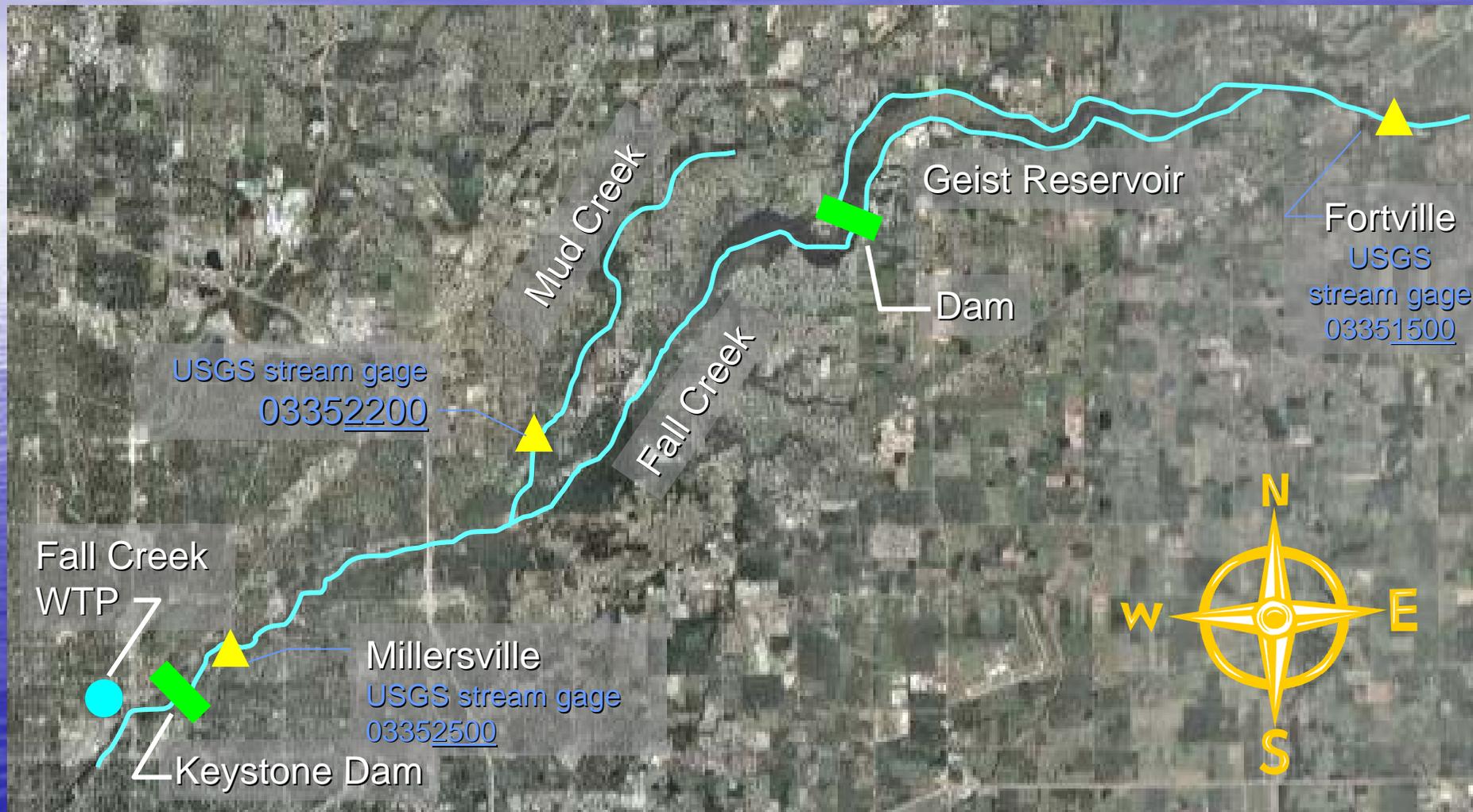
1933

1943

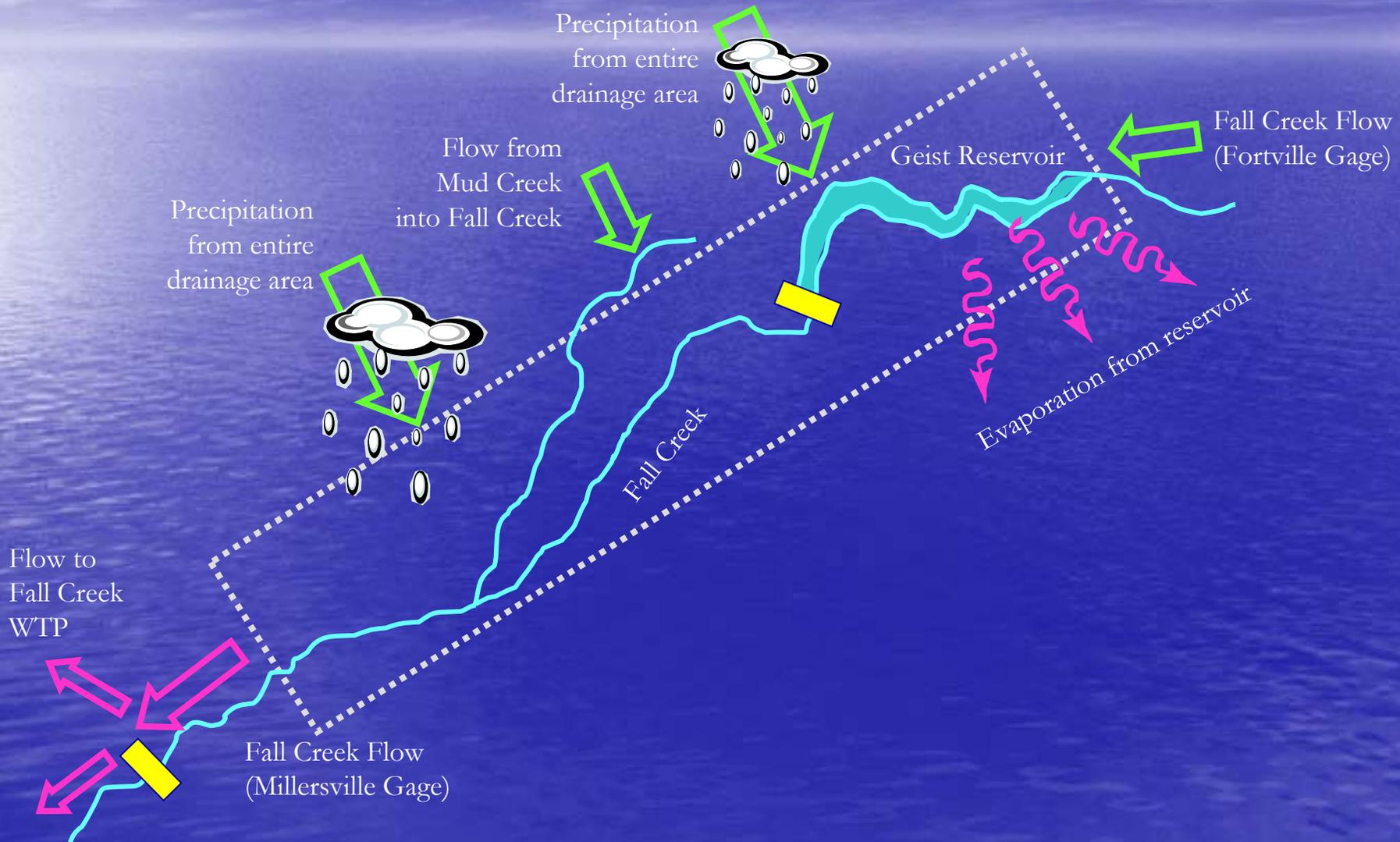
# Geist Reservoir – Fall Creek System Raw Water Yield Estimates



# Geist Reservoir – Fall Creek Surface Water System

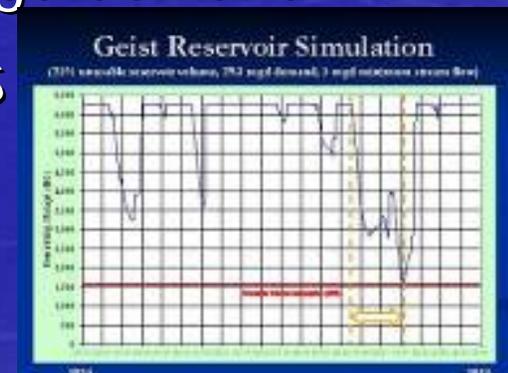


# Geist Reservoir – Fall Creek Surface Water Balance Model

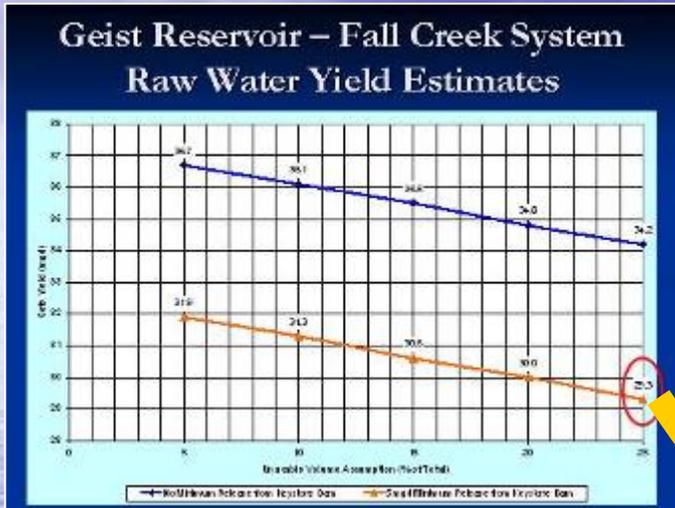


# Geist Reservoir Supply Estimate

- Approach 1 – Geometry
- Assumes
  - No inflow to reservoir
  - 29.3 mgd demand
- 161 days
- Approach 2 – Model
- Assumes
  - Simulated drought conditions with regard to precipitation and evaporation
  - 29.3 mgd demand
- 487 days



# WTP Capacity During Drought



$$\text{New WTP Capacity} = \text{Yield} - \text{Existing WTP Capacity}$$

$$\text{New WTP Capacity} = 1.31 \times 29.3 - 32$$

$$\text{New WTP Capacity} = 6.4 \text{ mgd}$$



Assumes: drought of record, 25% unusable reservoir volume, no groundwater use